

ANALYSIS OF WATER RIGHTS IN THE SEVIER RIVER BASIN

Part 3. Reservoir Operations

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## FOREWORD

This is the last of a three part series of reports written to clarify water rights and their existing administration in two principal reaches of the Sevier River. In our opinion, these reports were necessitated by the almost universal misunderstanding of the structure and intent of the Cox Decree. There has been and will undoubtedly continue to be challenges to this criteria, under which allocation of water is made among potential demands far exceeding the available supply. We believe an operationally based description of the legal rulings will substantially clarify the adjudications of water along the river as well as minimize conflicts over the intent and reasoning of earlier decisions.

Two types of water rights are operative in the Sevier River Basin; primary or direct flow rights and storage rights. Primary rights along the main-stem below Piute Reservoir were detailed in the two previous reports and are integrated with the storage rights in this report. Storage rights are entitlements to water which by nature of its time and spatial distribution is not useable for irrigation by direct diversion. Such flows include, for example, winter runoff, flood flow, and water returned by primary right holders because of insufficient need. Most of the conflict over water can be attributed to the fundamental distinction between these two rights. It is therefore important for this report to be accurate. The writers welcome comments, particularly where errors may have been inadvertantly introduced.

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## INTRODUCTION

From about 1860 to 1890, water users along the Sevier River (Figure 1) had succeeded in irrigating most of the land that could be supplied by direct diversions from river or stream channels. The natural hydrology provided excessive water in the winter and spring but often insufficient flows in late summer when crop needs are highest. Until the early 1890's, the natural flow and the stabilizing effect of irrigation return flows yielded enough water for most of the irrigated acreage. However, a series of dry years ensued when no water reached the Deseret area with which local farmers could mature their crops. The U. S. Supreme Court had affirmed the concept and definition of prior appropriation, although in the absence of any enforcement agencies priority had little meaning. Some western style extra-legal (and generally ineffective) actions were taken to provide local enforcement. Then in 1899, the Deseret Irrigation Company and the Leamington Irrigation Company initiated legal proceedings to establish their claims against all of the water users from Leamington to Vermillion Dam. Because the testimony was generally contradictory, the presiding judge (E. V. Higgins) placed the respective rights on a common priority which essentially recognized the maximum claim of each right and provided for a system of proration of the flow when insufficient water was available

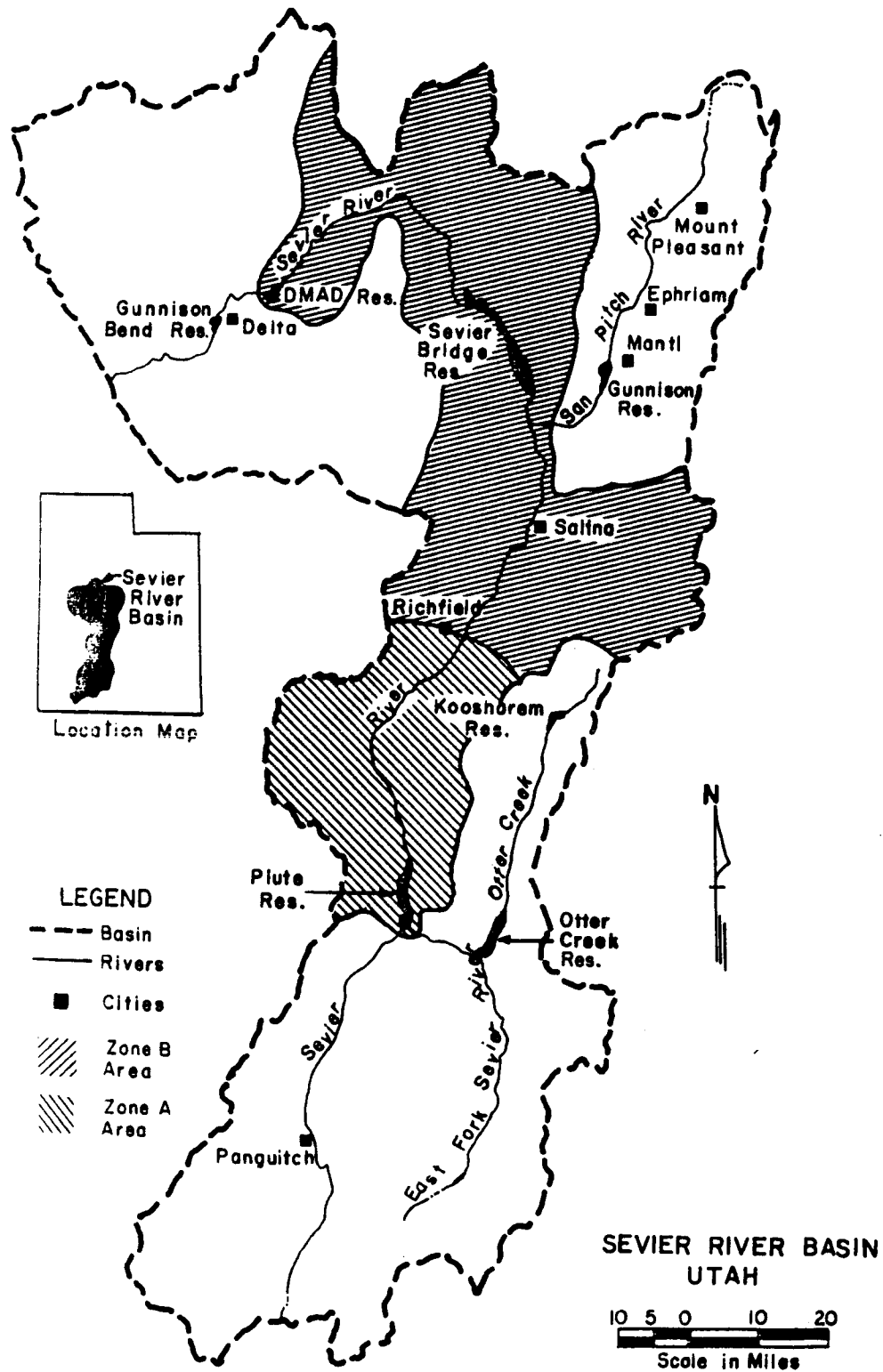


Figure 1. Location and setting of the Sevier River Basin.

to fill each right. The Higgins Decree was ineffectual because funds were not generated to hire a river commissioner to administer this decision.

The dry years of the 1890's caused the irrigators to investigate the possibilities of constructing reservoirs to supplement the supply. Gunnison Bend Reservoir was constructed around 1890 and Otter Creek Reservoir stored some water in 1897. In 1902, extremely dry conditions prompted the Deseret Irrigation Company to file on the winter water historically going to waste and begin construction of Sevier Bridge Reservoir. Commencing in 1906, the runoff far exceeded the irrigation needs and the storage capacities of the existing reservoirs. The State of Utah there upon filed an application for the high water to fill the yet to be constructed Piute Reservoir. In the same year, the Morse Decree was handed down adjudicating the existing primary and storage rights above Vermillion Dam. Consequently, the Sevier River was allocated by two decrees, neither of which included the Piute and Sevier Bridge Reservoir rights.

In 1916, the Richlands Irrigation Company brought action in the District Court of Millard County against various lower basin water interests to adjudicate its claimed rights. At about this same time, Utah enacted a law providing for the general adjudication of water rights along streams in the State. State Engineer George M. Bacon adopted the Richlands

case for the general adjudication and proceeded to delineate the lands served by each right and the water claimed by the right. His final determination entered in 1926 is now known as Bacon's Bible.

Although various conflicts were encountered, the most difficult were the storage claims made by Sevier Bridge and Plate reservoirs. To resolve the conflict over storage rights, both sides retained an impressive array of attorneys and experts, and then spent about \$350,000 to litigate the basic priorities of Sevier Bridge Reservoir. With about 750 additional conflicts to be resolved, the Sevier River water users concluded to negotiate differences and set the structure of water rights in the basin. Local committees succeeded after a great deal of effort in forging a document which became the decision in the Richlands action and is now known as the Cox Decree.

This brief history of water development in the basin is presented to give the reader a perspective concerning the relationship between storage and primary water rights. The Cox Decree is often confusing to those who do not understand its underlying intent. From an engineering stand point, it demonstrates a remarkable assessment of measures to maximize water use efficiency. Specifically, the proration criteria spread primary rights spreads shortages over the entire system, thereby encouraging individual irrigators to apply water to



only their best lands during water short periods. In addition, the holdover privileges in the reservoirs serves to stabilize the water supply from year to year. Nevertheless, the Decree outlines a very complex strategy for allocating water, and unfortunately, none of the original participants in the Cox Decree are alive today to clarify their intent.

#### DESCRIPTION OF THE STORAGE RIGHTS

The general adjudication of the Sevier Bridge and Piute reservoir storage rights is given in page 185-194 of the Cox Decree. Several of the provisions have since been clarified by court rulings and amended by agreements. There are five major segments in the storage descriptions: (1) identification of sources of storage water; (2) the division of a common supply among Sevier Bridge and Piute reservoir entitlements; (3) the relationship between Piute and Sevier Valley users; (4) the relationship among the owners of Sevier Bridge Reservoir; and (5) Otter Creek storage.

#### Sources of Storage Water

The common storage rights of Piute Reservoir and Sevier Bridge Reservoir are defined as entitlements to:

..."all the waters of the Sevier River yielded above the Sevier Bridge Dam from all and every source whatever, available for storage or use under their or any of their said water filings between October 1st of any year and October 1st of the succeeding year," (Cox Decree, p. 186).

Some of the storage filings were for any and all water available

at the time of the appropriation. This completely encompassing concept defines the relationship between direct flow and storage rights during the irrigation season. Whereas a right is limited to the needs for which the appropriation was made, generally irrigation and culinary, any water not diverted for these purposes becomes part of the source of supply covered by the storage filings. Because the direct flow rights were awarded on a daily flow basis there exists a possibility of some storage accumulation due to non-use or high flows each day. The division of this water is covered in the Cox Decree, p. 189. Computations showing some of these allocations were presented in two previous reports.

Another category of direct flow waters accumulating to storage is the primary waters remaining unused at the end of the irrigation season. The allocation of this water is provided for on page 195 of the Cox Decree:

..."Any and all water accumulated in either the Sevier Bridge or Piute Reservoirs by virtue of primary waters stored and forfeited for non-use during any season, and any and all water in any way accumulated in said Reservoir or otherwise, as water in excess of primary rights, as in this decree defined, shall be treated as storage water belonging to said Reservoirs under their filings, and shall be allocated and divided, as provided in this decree, and shall be held, released and otherwise administered in all respects as storage water under the provisions of this decree governing storage water accruing to the Piute Reservoir and the Sevier Bridge Reservoir under their respective filings."

The decree of primary flow to storage rights is also provided under paragraph (E), pp. 4 & 5, of the decree. To assure

further that the unused primary flows are a part of the common storage accumulation and that neither reservoir company would purchase so as to exclude the other from this source of supply, the Cox Decree, p. 190, states:

..."That none of the owners of Piute Reservoir except as hereinafter provided or Sevier Bridge Reservoir shall contract with any other owners or users of water of the Sevier River to use by direct diversion or store primary water for such other owners or users in either the Sevier Bridge Reservoir or the Piute Reservoir prior to April 15th of any year, and provided further that none of the parties hereto will purchase for storage in either Piute Reservoir or Sevier Bridge Reservoir or Fool Creek Reservoir or for use by direct flow any of the primary or direct flow water rights of the Sevier River prior to April 15th of any year."

The procedure for transferring (to storage) the primary water remaining in the reservoirs at the end of their storage period is important in understanding reservoir operations. The first full paragraph, p. 190, of the Cox Decree simply provides that the unused storage accumulation of one year does not become part of the common storage rights for the next succeeding year. To a reader who might not be familiar with the computations dividing the storage water, this section of the Cox Decree might be interpreted as awarding unused primary accumulations to the reservoir in which they were impounded and be directly contradictory to the sections requiring a division of this water. Instead, unused primary accumulations in the storage reservoirs becomes part of the common "new" storage in the succeeding year.

Division of Water Between Piute and Sevier Bridge Reservoir

The storage accumulations are allocated to the respective reservoirs according to the following priorities (Cox Decree, p. 186):

1. the first 89,280 acre-feet goes to Sevier Bridge;
2. the next 40,000 acre-feet to Piute;
3. of the next 32,000 acre-feet, 75% to Sevier Bridge and 25% to Piute;
4. the next 13,720 acre-feet to Sevier Bridge
5. of the next 75,000 acre-feet, 75% to Sevier Bridge and 25% to Piute; and
6. all further water is to be allocated 85% Sevier Bridge and 15% Piute.

This formula would fill both reservoirs at approximately the same time, thereby maximizing the effective storage capacity in the system.

Within one year of the Cox Decree a question arose as to the specific meaning of the priorities noted above and the respective distribution of transmission losses when water was moved to Sevier Bridge Reservoir. By April 1st of 1937, winter storage in Sevier Bridge amounted to 63,000 acre-feet while 37,000 acre-feet had accumulated in Piute. Another 49,000 acre-feet of storage water was impounded during the irrigation season in Piute Reservoir. According to the provisions of the decree, April 1st found that Sevier Bridge was short of its

first priority by 26,280 acre-feet, the amount of which was subsequently released from Piute Reservoir. However, in conveying the water to Sevier Bridge, 11,000 acre-feet were lost. In the resulting dispute, the State Engineer gave an opinion that Sevier Bridge is entitled to its share of the total accumulation without loss i.e., net water in Sevier Bridge Reservoir. Other questions at the time included the validity of the loss figures and whether or not Sevier Bridge should stand its own losses in moving third, fourth, fifth, and sixth priority allocations.

The actual example using transmission losses as now computed will serve to illustrate the questions raised above. Two methods might be applicable to the division of the 149,000 acre-feet representing the available storage supply. The first method according to the interpretation of the State Engineer was to make the division of the total accumulation regardless of location. Sufficient of the storage waters in Piute would have to be released to satisfy the Sevier Bridge allotment without loss in Sevier Bridge Reservoir. In this case, there would be in effect 63,000 acre-feet in Sevier Bridge and 86,000 acre-feet in Piute of which 42,070 acre-feet would be due Sevier Bridge. Current loss estimates indicate that to get this water between the two reservoirs would require a release from Piute Reservoir of 54,623 acre-feet, leaving a storage supply of 31,377 acre-feet available to the users of

Piute Reservoir. The State Engineer later petitioned the Fifth Judicial District Court to clarify the decree in this matter. Judge Hoyt's decision stated that each priority should be filled in order and should not be subject to any transmission losses incurred in the delivery of a later priority water. The division of water in 1937 under this condition would require the release of 34,952 acre-feet from Piute Reservoir as soon as possible after April 1st (in order to yield 26,280 acre-feet at Sevier Bridge and thereby fill its first priority). This would leave 2,210 acre-feet in Piute Reservoir towards its second priority which would in turn be filled by the 49,000 acre-feet coming during the irrigation season. After the 49,000 acre-feet were impounded, however, there would be 11,210 acre-feet owing the joint third priority. Piute would then release 8,968 acre-feet to yield a net inflow to Sevier Bridge of 6,726 acre-feet as required leaving 2,242 acre-feet in Piute as its share of the third priority. As can be seen, the first interpretation gives Piute Reservoir a total supply of 31,377 acre-feet as opposed to the second yielding 42,242 acre-feet. The Hoyt decision was appealed to the Utah Supreme Court but dismissed under terms of the so-called 1938 Agreement to be discussed next.

The operation of the reservoirs as proscribed by the decree and later interpreted proved to be unsatisfactory. Specifically, the provisions that declared all holdover

common caused very wasteful irrigation practices on a system that was already short of water (irrigators would lose their allotments at the season's end). Consequently, if any reason to irrigate could be conjured up, credits would be run out rather than "lose" the water. From a company stand point, the same adverse conditions resulted. These factors and the controversy over transmission losses, pending transfers, interpretation of priorities and the above holdover restrictions led to a review by Sevier Bridge and Piute of the reservoir operations. As a result of this review the respective parties entered into the so-called "1938 Agreement".

The 1938 Agreement amended the Cox Decree and provided the following:

- (1) Sevier Bridge owners each of them, and severally, could holdover their unused storage water less appropriate losses as determined by the river commissioners;
- (2) Provisions were made to balance the reservoir accumulations commencing January 1st of each year rather than during the irrigation season when losses would be higher;
- (3) Agreement was made to stipulate a decree allowing Piute to transfer to Piute Reservoir acquired primary rights in Zone B; and
- (4) The appeal pending in the Utah Supreme Court

involving the interpretations of the storage priorities as given previously was dismissed.

The amended provisions for allocating Sevier Bridge and Piute storage water under the 1938 Agreement are contained in items 2a and 2b in the document. The river commissioners, under the direction of the State Engineer, were to evaluate the storage accumulations on or after January 1st of each year. They were to then estimate the additional storage make into the two reservoirs that could be expected by April 15th and release water from Piute Reservoir, if necessary, to satisfy the respective storage priorities. Since these transfers could be made during cold weather and before the irrigation season, transmission losses would be minimized and greater water use efficiency achieved. Because of the uncertainty in estimating river flows, provisions were made for a one year holdover privilege for Piute in Sevier Bridge in order for the former to make up the error the next year. Specifically, if the commissioners underestimated the accretions below Piute Reservoir which would go towards the Sevier Bridge entitlement and thereby cause excessive releases from Piute Reservoir, then the following year Piute would deduct the excessive release minus appropriate transit and storage losses from Sevier Bridge's first priority. The 1938 Agreement was administered as outlined from 1938 to 1943. However, by March 30th of 1943, both Sevier Bridge and Piute had in their respective reservoirs somewhat



more than the 129,280 acre-feet encompassing the first two priorities. Piute Reservoir was at its seventy-six foot contour and although had capacity to the eighty foot contour, released 3,847 acre-feet to avoid a further rise in water level. Their decision was made to avoid flooding lands which were not under an agreement regarding such contingencies and thereby subjecting Piute to damage claims. Because of the apparent abundance of runoff in 1943, no releases administered by terms in the 1938 Agreement were made from Piute Reservoir except that noted above. Thus even though no projections of runoff were made for the purpose of allocating the storage priorities before April 15th, Sevier Bridge Reservoir received 13,226 acre-feet more than its share of 75% of the third priority (3,847 acre-feet from Piute releases and 9,379 acre-feet from accretions below Piute Reservoir). The following year, 1944, Piute claimed the 13,226 acre-feet according to the 1938 Agreement and the Sevier Bridge owners resisted. The final settlement was made by the Utah Supreme Court (Watson, State Engineer V., Deseret Irrigation Company et al., 110 Utah 78, pp. 78-98). Specific details of the claims, counter claims, and argument by the court are left to the interested reader, but several pertinent points are necessary to understanding how the storage allocation is now made.

First, Piute has no general storage rights in Sevier Bridge Reservoir. The holdover that could be claimed the next succeeding

year only is the water accruing to Piute's Deseret Irrigation Company stock, excess water released from Piute Reservoir due to miscalculations by the commissioners of water due Sevier Bridge, and storage water made below Piute Reservoir in excess of the commissioner's estimate which could have been offset by water captured in Piute Reservoir. Second, Piute's right is limited to the natural ability to capture water in its own reservoir. This means that Piute must be able to capture enough excess water from flows entering the reservoir to offset their share of storage flows entering the river below Piute Reservoir in the same year. And third, Piute Reservoir is considered filled at the seventy-six foot contour. Any storage water by-passed by reason of Piute Reservoir being at the seventy-six foot contour that found its way over Vermillion Cam belonged to Sevier Bridge regardless of the priority being filled.

#### Relationship Between Piute and Sevier Valley Users

One more question involving the computation and transfer of the storage waters has arisen since the interpretation of the 1938 Agreement. The A-L Users gave up their winter irrigation rights for storage rights in Piute Reservoir, with no reservoir losses being assessed during the irrigation season. As long as there was water belonging to Sevier Bridge impounded in Piute Reservoir any water irregardless of source over Vermillion Dam was used to satisfy the credits due Sevier Bridge

Reservoir. This procedure allowed the A-L Users to offset, by exchange with the storage water due Sevier Bridge, any primary water made below Piute Reservoir which had flowed over Vermillion Dam. A ruling by the Utah State Engineer, July 31, 1961, disallowed this exchange. In the face of impending litigation, the respective parties proposed a regulating stream, the details of which have not at this time been finalized.

As noted before, the A-L Users have certain rights in Piute Reservoir. The important provisions are: (1) that in the event of a wet year and there is insufficient capacity in Piute Reservoir to accomodate the supply, the A-L storage is limited to 9,000 acre-feet; (2) the A-L Users have a right to draw up to 3,000 acre-feet in March against their anticipated accumulation; (3) the A-L Users can call for their water impounded in Piute Reservoir as needed without diminution; and (4) any water remaining in the Piute Reservoir November 1, is forfeited to the next years storage supply.

#### Relationship Among the Users of Sevier Bridge Reservoir

Because Sevier Bridge Reservoir is utilized by more interests and storage of primary waters is also involved, the relationship among its owners is more complex than for the case of Piute Reservoir. At the beginning of the 1970 storage season (October 1, 1969) it became apparent that Sevier Bridge Reservoir would probably fill before the irrigation

season started. The division of waters in this event as set forth on pp. 190-193 of the Cox Decree had been very infrequently tested, and in fact, no general agreement as to the operation of the reservoir in this event existed. This prompted an exhaustive review of the historical development and associated legal structures provided for division of Sevier Bridge storage entitlements. It is probably useful to repeat a summary of this review in order to lend clarity to the eventual outcome.

After the Higgins Decree of 1901 adjudicating the direct flow rights below Vermillion Dam, a number of interests filed for storage rights on water historically wasted. The first of these, known as the 1902 Hawley filing in behalf of Deseret Irrigation Company was made for 1,500 cfs and the Sevier Bridge dam site where sufficient water was to be stored to irrigate 70,000 acres. By 1907 the dam had been constructed to the sixty-six foot elevation. During the latter part of the interval, Deseret initiated negotiations with the Melville Irrigation Company and others to complete the reservoir to a sufficient capacity to fully utilize the waters of the Hawley filing. The result of these negotiations was a three party partnership in the reservoir involving Deseret, Melville, and the Oasis Land and Irrigation Company (now the Delta Canal Company). A second group of water users, the Sevier Land and Water Company (now the Central Utah Water Company), filed an application in 1907 to use and store all unappropriated waters in the Sevier River

Basin. They probably were intending a right in excess of the storage capacity in Sevier Bridge Reservoir above the sixty foot contour even though the Sevier Bridge owners were considering the Hawley filing for more water than this contour implied. The Central Utah interests acquired a deed to what is known as the Dover Reservoir site from a group who had filed an application for the site in 1908. It might be noted that the Dover Reservoir site was considered by the Leamington Water and Land Company in 1883 when the Secretary of the Interior granted them an easement for the site.

In requesting a new easement for the Dover dam site, Central Utah was opposed by the owners of Sevier Bridge who had also in 1909 applied for an easement to expand Sevier Bridge facilities. If both had been approved, the system could have had two reservoirs overlapping one another. Soon after these efforts, the respective parties began negotiating on consolidation of the Sevier Bridge and Dover interests. In 1912, the ~~Sevier Bridge~~ easement was granted and in 1913 the consolidation was made by the so-called "Four Party Contract".

The Four Party Contract was an agreement to consolidate the water rights, enlarge Sevier Bridge Reservoir, apportion the water, and state the reservoir's operating criteria. There are five particular paragraphs of importance here. Paragraph I listed the ownership in the existing reservoir (the first increment) as belonging to Delta (50%), Melville (33.33%),

and Deseret (16.67%). Storage capacity above the sixty foot contour, or the second increment, was divided in Paragraph III as follows:

Central Utah	41%
Deseret	26%
Delta	17%
Melville	16%

Then in Paragraph IV, the two segments were combined to express each interest's respective ownership in the total enlarged capacity (expected to be about 250,000 acre-feet):

Central Utah	23.94%
Deseret	22.12%
Delta	30.73%
Melville	23.21%

Paragraph V contains five key provisions of which the last four are of primary interest. When the reservoir fills ~~during~~ the non-irrigation season, the surplus belongs to Central Utah as per their storage filings. The impounded water was to be divided according to the fractions listed in Paragraph IV. If the reservoir did not fill before the ~~irrigation~~ season began, the water withdrawn in excess of the 104,000 acre-feet and up to 250,000 acre-feet would be divided according to Paragraph III. When the total withdrawals exceeded 250,000 acre-feet the division was set forth in Paragraph IV. The distinction given here is that supplies ~~in excess of~~ 250,000 acre-feet occurring during the non-~~irrigation~~ season belongs to the Central Utah Water Company ~~and quantities~~ in excess of the 250,000 acre-feet coming during

the irrigation season is divided among the four companies: In years when Sevier Bridge did not fill in either case, waters were to be divided according to Paragraphs I and III. Any unused water became a part of the next year's supply. Since filling in any year would be significantly affected by releases, the parties agreed to a procedure outlined in Paragraph VI for official opening and closing the irrigation season. Water could be released when demands warranted but not to simply store elsewhere.

After the Four Party Contract and long prior to the Cox Decree, Deseret sold the Abraham Irrigation Company 5.45% of its entitlement in the second increment along with the necessary storage water to utilize it. Melville sold Central Utah 3/20 of their 2/6 interest in the first storage increment and their entire 16% in the second. The Cox Decree affirmed the Four Party Contract and the ownership fractions given on pp. 192-193 so indicate. However, at the time of the Cox Decree the enlargement of Sevier Bridge had been completed with the capacity of only 236,000 acre-feet. Nevertheless, the Four Party Contract percentages were maintained so the provisions for allocating water when the reservoir filled are now:

Central Utah	35.37%
Deseret	18.93%
Delta	30.73%
Melville	11.79%
Abraham	3.18%

~~The 1938 Agreement~~ allowing individual and collective ~~holder~~ was a significant change in the operations as defined ~~by the Cox Decree~~. By allowing each company to retain ownership of its unused water at the end of the irrigation season, ~~the division of new storage waters is based not on reservoir capacity but the volume of the new storage accumulations.~~ Thus, the first 104,000 acre-feet is allocated according to the last paragraph, p. 192, of the Cox Decree and the remainder according to the following paragraph on p. 193. However, if the reservoir should fill to its capacity of 236,000 acre-feet, the water is declared common and distributed as given above (based on ownership in the total). Of course during the irrigation season, the primary users are entitled to store their rights as needed in exchange for recall water later in the season as outlined in our previous report. In this event, the exchange primary credits are guaranteed so that Sevier Bridge cannot be "filled" as such. Consequently, waters above the impounding capacity are allocated on a direct flow basis for all the rights other than the exchange users.

~~Also~~ The Sevier Bridge Reservoir operation as governed by the rules previously described is complicated not only by the difficulty of the legal language but also the interactions with the primary rights. To assist the reader who may want a thorough understanding of the Sevier Bridge operation, we believe it would be helpful to consider the decision process



as it might occur in the course of a water year.

Beginning on October 1st of each year, the contents of Sevier Bridge become holdover water even though some might be used later if the demands require releases from the reservoir. The remainder is diminished by 5% to account for storage losses. For many years, the formal steps necessary to open or close the irrigation season have not been taken (primarily because the 1938 Agreement eliminated the need). Consequently, the commissioners release water from Sevier Bridge until no viable demand further exists. So long as these releases are not simply re-stored, the actions are in compliance with the agreements.

~~The river flows between October 1st and March 1st are divided into two parts. The accumulations below Sevier Bridge belong to Abraham, Deseret, and Central Utah. Abraham and Deseret are entitled to the first 9,300 acre-feet to store in either DMAD or Gunnison Bend reservoirs. All water above this quantity goes to Central Utah to store or use in Fool Creek Reservoir. Since Central Utah cannot irriage lands under its system from Fool Creek Reservoir, as soon as capacity is available in DMAD or Gunnison Bend water is released from Fool Creek back into the River. Central Utah then diverts a like amount from the river, thereby utilizing its reservoir capacity by exchange.~~

Flows above Sevier Bridge are captured in either Piute or Sevier Bridge reservoirs and become part of the new storage

for the upcoming irrigation season.

Between March 1st and April 15th, the primary rights below Vermillion Dam begin with Abraham and Deseret being able to store (except DMAD may not be used for water by-passed through Sevier Bridge Reservoir unless no other capacity is available and the water would be wasted). The unused primary ~~above Sevier Bridge becomes part of the new storage supply held in Sevier Bridge.~~ However, if the accretion below Sevier Bridge is insufficient to satisfy the primary rights below, they may request the difference be released from Sevier Bridge. Such releases of course are limited to a needed demand under their systems and not be stored and prevent filling of Sevier Bridge Reservoir. It might be noted that Sevier Bridge might already be full during this period. In addition, Delta and Melville may open their irrigation season and release water from the reservoir. These conditions create a number of possible scenarios. For example, ~~if Sevier Bridge is filled before March 1st, the Abraham and Deseret companies must use or lose since no storage space is available, and the excess is available to Central Utah. Central Utah's entitlement, also on a use or lose basis, to the excess ends April 1st.~~ If Sevier Bridge fills during March, the allocation on all water is made according to the same provisions discussed previously. However, Delta and Melville may have sufficient demand that they actually create capacity in Sevier Bridge. If the

reservoir had already filled, the contents would have been re-allocated so that storage accumulations after capacity was created in the reservoir would be divided according to the total ownership until the end of the irrigation season. If the diversions by Delta and Melville prevent Sevier Bridge from filling, the allocations remain according to the first and second increment criteria and Abraham and Deseret may again store their primary in the reservoir.

On April 15th, the exchange users are allowed to accumulate storage credits in the reservoir. Since these credits are guaranteed, capacity must always exist in Sevier Bridge. Consequently, ~~Sevier Bridge cannot be "filled" after April 15th except when no primary credits have been made.~~ Under these conditions, storage water in Sevier Bridge during the irrigation season (assuming it had not filled earlier) would be allocated according to the division of water discussed previously for the two increments of the storage ownership.

The accounting necessary to determine the storage rights in any year commences on October 1, preceeding the irrigation season. There are several determinations that are necessary to account for the water. Different years will be used as examples in order to cover the various possibilities. Each reservoir will be allocated and then Piute and Sevier Bridge will be combined to show the division of the water.

### Otter Creek Reservoir

For several years prior to 1896, the farmers in Sevier Valley suffered severe losses to their crops due to insufficient water late in the growing season. To alleviate these shortages an organization was formed for the purpose of constructing Otter Creek Reservoir. The Sevier Valley companies subscribed for stock under a plan that half could be paid for in labor. Later as the work progressed the companies were asked to purchase additional shares. This procedure was followed until completion of the dam with a resulting ownership in Otter Creek Reservoir at the present time as follows:

Monroe South Bend Canal	18.22%
Sevier Valley Canal Company	19.95%
Joseph Irrigation Company	5.34%
Wells Irrigation Company	2.84%
Monroe Canal Company	11.35%
Elsinore Canal Company	4.76%
Brooklyn Canal Company	5.27%
Richfield Canal Company	21.68%
Annabella Irrigation Company	2.27%
Vermillion Irrigation Company	8.31%

The quantity available for distribution under this division is subject to the 35 cfs guaranteed rights as provided, p. 31, Cox Decree. This quantity is fixed commencing as each right calls for the flow until September 30th.

### WINTER STORAGE

The water accumulating in the Sevier River's major storage facilities between irrigation seasons must be allocated before the 15th of each year. However, the provisions of the 1938

Agreement and the opening of the zone A irrigation season April 1st, requires the commissioners to make three previous determinations in order to effect proper water allocations. The first storage computation is made October 1st when the holdover volumes are defined. Then January 1st, the commissioners begin the Sevier Bridge - Piute Reservoir divisions. Next on April 1st, the new winter storage water is calculated by deducting the net holdover from the reservoir contents. And finally, after April 15th when the zone B primary users have storage privileges, the storage must be again resolved.

In previous reports, detailed flowcharts were developed to illustrate the computational procedures suggested by the Cox Decree and its amendments. Storage waters are generally handled monthly as credits with no accounting by interest or location until the end of the irrigation season. Consequently, a better illustration for this report is examples of the calculations for years when the important elements are present. These illustrations will be made on a reservoir by reservoir basis.

#### Otter Creek Reservoir

Otter Creek Reservoir has no complicating provisions which necessitates an accounting of water on October 1st or in the Spring. ~~The quantity of water remaining in the reservoir at the end of the irrigation season is retained by the respective owners until the following year.~~ The rights decreed to Otter Creek are sufficient to fill the reservoir to its 52,590 acre-

feet capacity. In addition, these rights have been increased by the storage exchange for the Kingston Irrigation Company (a more complete description of the Kingston exchange is given in our first report). An example of the winter storage computation for Otter Creek Reservoir is given for the 1975 water year below in Table 1.

Table 1. Winter storage computation for Otter Creek Reservoir.

October 1, 1974 Contents	18,120 acre-feet
Releases to Piute Reservoir after Oct 1st	<u>2,521 acre-feet</u>
Holdover	15,599 acre-feet
April 1st Contents	38,340 acre-feet
Holdover -5% winter loss	<u>14,819 acre-feet</u>
Winter Storage	23,521 acre-feet
Kingston's et al, Guaranteed 35 cfs (started April 29th)	10,760 acre-feet
Available Winter Storage	12,761 acre-feet

Piute Reservoir

If the credits in the reservoir system have been properly balanced as of October 1st each year, the waters in the respective reservoirs belong exclusively to the reservoir owners.

In the case of Piute Reservoir, the October 1st contents are owned by the reservoir company and the A-L users. However, since this date represents the year end for the Sevier Bridge -  
water storage rights, Piute Reservoir contents must be

segregated. Piute's water, less any expressly released for its stock delivery, becomes the holdover quantity. The A-L water minus releases for irrigation after October 1st becomes part of the succeeding year's new storage supply. Some culinary, irrigation<sup>1/</sup> and stock watering needs are also supplied from Piute Reservoir during the winter.

In the process of acquiring the necessary easements for their reservoir, Piute became the owners of certain primary rights as summarized in our earlier report. These are tabulated below in Table 2.

Table 2. Piute Reservoir and Irrigation Company Zone A primary rights. (cfs)

	Oct 1- Dec 31	Jan 1- May 15	May 16- June 1	June 1 Oct 1
From East Fork below Kingston gauge	1.66	3.00	3.00	1.66
Price Springs	1.78	1.78	1.78	1.78
Barnson Springs in Reservoir	12.00	12.00	12.00	12.00
From the South Fork	.84	.84	.84	.84
O.C.Snow water	--	--	1.50	1.50
	16.28	17.62	19.12	17.78

These rights yield 6,117 acre-feet (6,152 for a leap year) during the October 1 - April 1 period, and since they are

Water is released when the accretions below Piute Reservoir are insufficient to supply the direct flow rights of Monroe South Bend, Sevier Valley Canal, Annabella Canal, and Vermillion Canal.

prior primary rights, they are not counted as part of the storage accumulation. The Piute Reservoir winter storage calculation for 1975 is given in Table 3.

Table 3. Piute Reservoir winter storage computation, 1975.

October 1st 1974 Contents	5,330 acre-feet
Otter Creek release -7%	2,345 acre-feet
A-L use after Oct 1st	<u>-240 acre-feet</u>
October 1, 1974 holdover	7,435 acre-feet
April 1st Contents	46,900 acre-feet
Holdover -5%	<u>-7,063 acre-feet</u>
New Water	39,837 acre-feet
Piute Reservoir Primary	<u>-6,117 acre-feet</u>
Winter Storage	33,720 acre-feet

Sevier Bridge Reservoir

~~As of October 1st, the water in Sevier Bridge Reservoir~~  
~~can be credited to several accounts; namely each of the owners~~  
~~of Sevier Bridge Reservoir, all of the several exchange users,~~  
~~and the Lincoln Cropper right.~~ (It might also be mentioned  
that overdrafts might have occurred.) On occasion some storage  
water accruing during the current year has been impounded in  
Rocky Ford Reservoir as of October 1st. Inasmuch as all the  
water has been allocated, the overdrafts are in effect the  
borrowing of some other user's holdover. Thus, the overdrafts  
are then paid back by the overdrafting user from his next year's



supply when credits become available. Of the water credited as of October 1st, some may be withdrawn for use. Below Sevier Bridge Reservoir, as noted in our second report, Leamington, McIntyre, and Lincoln Cropper have an opportunity to use their credits under certain limitations.. The unused credits as of November 1st of these three primary users below Sevier Bridge together with the unused credits of the exchange users diverting above Sevier Bridge Reservoir (as of October 1st) are segregated and become a part of the supply going to the next year's storage. A primary user having credits and diverting above Sevier Bridge can divert the October 1-10 primary flow in addition to any credits. This diversion of credits reduces the new storage flow into the reservoir and thus effects the exchange of credits in the reservoir with new storage water in the river. This should help to explain why unused primary water goes to the succeeding year's storage. Overdrafts incurred by the rights above the reservoir are taken care of by limiting the primary diversion sufficiently to achieve a balance. In the event a balance cannot be reached, the overdrafts of the users above and below the reservoir are taken care of when credits do become available as previously noted.

For the 1975 year, the computation of the winter storage in Sevier Bridge is given below in Table 4.

Table 4. Sevier Bridge winter storage calculation.

October 1st Contents	101,100 acre-feet
Overdrafts	163 acre-feet
Unused 1974 Primary	<u>-2,099 <sup>17</sup>/<sub>100</sub> acre-feet</u>
Holdover	99,164 acre-feet
April 1st Contents	180,400 acre-feet
Holdover -5%	-94,206 acre-feet
Stored March Primary	<u>-5,649 acre-feet</u>
Winter Storage	80,545 acre-feet

~~In summary then, the Sevier Bridge holdover is determined by subtracting the unused primary, ten percent of the exchange users' October credits, and the releases for irrigation below the reservoir from the October 1st contents. This volume when reduced 5% to account for winter losses becomes the April 1st holdover figure.~~

It might be useful to remind the reader that the storage period ends in the lower zone on March 1st even though additional storage water accumulates in Sevier Bridge from the undiverted primary flows. (with the exception of Deseret, Abraham, and Central Utah who have storage privileges beginning April 1st)

The accounting for the winter storage has been made by measuring the reservoir contents, but it might be recalled ~~that the possibility exists of unused primary contributing to~~

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includes a 10% deduction from October primary above Sevier Bridge from the exchange users.

~~the storage supply~~ until April 16th. Consequently, this ~~procedure is repeated~~ April 15th and if the undiverted primary ~~exceeds the reservoir losses~~ this additional water is added ~~to the supply.~~

As previously mentioned Piute acquired certain primary rights in the lower zone. These were exchanged upstream with the provision that this water would be considered as the first storage water going to satisfy the first priority 89,280 acre-feet accumulated in Piute Reservoir, and Sevier Bridge would receive the primary flows in lieu thereof. Thus it could be ~~stated~~ that, except for Piute's Deseret stock, Piute first ~~receives~~ their primary rights regardless of the subsequent distribution of the storage supply. We can now resolve the ~~two~~ reservoirs, again using the 1975 example (Table 5).

Table 5. ~~1975 Allocation of Sevier Bridge and Piute Reservoir waters.~~

April 1st Winter Storage (Sevier Bridge)	80,545 acre-feet
Piute's Holdover of Deseret stock	2,531 acre-feet
Piute's Zone B Primary	<u>5,915 acre-feet</u>
New Storage	88,991 acre-feet
April 1st Winter Storage (Piute Reservoir)	33,720 acre-feet
Piute's Deseret Stock Holdover	-2,531 acre-feet
Piute's Zone B Primary	<u>-5,915 acre-feet</u>
New Storage	25,729 acre-feet

Table 5 shows that as of April 1st 1975, Piute owed Sevier Bridge 289 acre-feet to satisfy the first priority in their common right. It was apparent that additional spring and summer storage would more than erase the deficiency, so no releases were made.

#### CREDITING DURING THE IRRIGATION SEASON

~~Once the irrigation season begins, the river system from Otter Creek and Piute reservoirs to the end of the river is operated as a large credit bank. All of the rights are issued credits monthly equaling the acre-foot accumulation of their rights. At the end of the month the diversions are totaled and deducted from the credits for each company. Credits are then balanced with water by applying the appropriate losses. Although for most requirements, none of the credits are segregated as to ownership in each reservoir until it becomes necessary at the end of the season when the proper balance can be achieved from the crediting records.~~

The circumstances of two of the diverting companies should be mentioned. Neither Vermillion Canal nor Monroe South and Canal have storage rights for their primary flows, however, each have substantial storage rights in Otter Creek Reservoir which are issued as credits. Any daily diversion in excess of their direct flow rights is subtracted from these credits. A diversion of less than the direct flow rights causes a loss

for which there is no way to compensate because all the water in the reservoirs has already been issued as credits.

### Reservoir Losses

The losses, and/or gains, for the major reservoirs are not only a result of evaporation but also include decreed flows through the reservoirs and administrative losses due to the nature of measuring inflows and outflows. Due to erratic measurement, inflows within the reservoir exceeding decreed rights, or bank storage inflow derived from declining water levels, occasion the computation of periodic reservoir gains. The policy of the commissioners has been to take the losses needed and apply any gains against any succeeding losses. The reservoir losses are assigned according to decree and generally applied to the storage companies on the basis of their percentage of the total withdrawal. Tables 6 and 7 illustrate the reservoir loss computation for Piute and Sevier Bridge in 1975.

Table 6. Calculation of May 1975 Piute Reservoir losses.

April 30th Contents	45,580 acre-feet
Decreed Primary within reservoir (16.78 cfs)	1,032 <sup>1</sup> / <sub>2</sub> acre-feet
A-L Primary with reservoir (22 cfs)	1,353 acre-feet
Otter Creek delivery to Allen Ditch & Kingston Main Canal	<u>2,557 <sup>2</sup>/<sub>2</sub> acre-feet</u>
Total	53,372 acre-feet
May 31st Contents	31,830 acre-feet
May Releases	<u>21,317 acre-feet</u>
Total	<u><u>53,147 acre-feet</u></u>
Piute Reservoir Loss	225 acre-feet

Table 7. Calculation of May 1975 Sevier Bridge Reservoir losses.

April 30th Contents	186,500 acre-feet
Inflow past Gunnison	+16,650 acre-feet
Internal Primary (20 cfs)	<u>+1,230 acre-feet</u>
Total	204,380 acre-feet
May 31st Contents	175,300 acre-feet
Releases	<u>+26,589 acre-feet</u>
Total	<u><u>201,889 acre-feet</u></u>
Sevier Bridge Reservoir Loss	2,491 acre-feet

3.00 cfs, 12.00 cfs, and 1.78 cfs.

estimate diversions by Allen Ditch and Kingston Main.

The Piute Reservoir losses are born exclusively by the Piute Reservoir and Irrigation Company except when summer storage is being captured in Piute Reservoir whereas Sevier Bridge losses are distributed among the Central Utah, Delta, Melville, Abraham, and Deseret Companies. Allocation of the Sevier Bridge losses are determined by:

$$\text{1st of month credits} + \frac{\text{New Storage} - \text{Use}}{2} = \text{Average Use}$$

The losses are then prorated according to average use such that for an individual company:

$$\text{Loss for Company} = \frac{\text{Company Average Use}}{\Sigma \text{Average Use}} \times \text{Reservoir Loss}$$

In our first report, we noted the river losses applied against storage water being moved through the river system. A more detailed examination of these loss rates is developed below.

Water to Piute Reservoir: When the Kingston Irrigation Company's East Fork primary right was transferred into Otter Creek Reservoir via the Otter Creek Inlet, the practice evolved to divert as much of the East Fork above the inlet as possible into the reservoir. Generally, the only times during the irrigation season when storage water would occur in the East Fork would be when the Section A primary had

filled the first, second, and third classes when flows were by-passing Otter Creek Inlet. Since these conditions do not occur together very often, the water diverted into Otter Creek Reservoir is either Section A primary or Kingston and Otter Creek's storage right. In addition to these flows, releases from Otter Creek may also include supplies intended for Otter Creek stockholders in Sevier Valley.

The A-L users do not have decreed primary storage privileges in Otter Creek Reservoir so it must be assumed that the first priority for releases are Section A primary and Kingston deliveries. Quantity above these amounts would be deliveries to the reservoir's stockholders. ~~All storage releases from Otter Creek Reservoir are charged a 7% loss.~~

~~Reservoir to Vermillion Dam. Storage releases from Piute Reservoir during the irrigation season are charged a 15% loss if they are for Sevier Bridge and a 6% loss if they are for Piute (through the Sevier Valley Canal diversion).~~

Identification of the rights to give credits and assign losses when storage water is released from Piute Reservoir, however, becomes quite complex. Specifically, ~~flows over Vermillion Dam must be delineated as to origin, i.e., releases from Piute Reservoir for delivery to Sevier Bridge (15% loss), Section A primary allocation to storage (limited to flows entering the river below Piute Reservoir), and Section A primary made below~~



Piute Reservoir but by-passed because flows exceeded the diversion-needs of the A-L users. In fact, all three kinds of water can be passing over Vermillion Dam simultaneously.

~~In order to prevent misunderstanding and facilitate efficient water management, several operating criteria needs to be set for the river between Piute Reservoir and Vermillion Dam. ~~When~~ when water is due Sevier Bridge, releases from Piute specifically for Sevier Bridge should be co-ordinated between the commissioners so that proper crediting can be made.~~

~~When the second priority in Section A primary allocates storage water, flows over Vermillion Dam should be credited as storage. This rule preserves the flows available to the A-L users and helps divide water between Piute and Sevier Bridge. During the irrigation season when water is due Sevier Bridge (and the regulating stream does not apply) the flow over Vermillion Dam up to the volume represented as the difference between Piute Reservoir releases and Piute Canal diversions should also be credited to Sevier Bridge. Otherwise the entire flow over Vermillion Dam could be by-passed section-A primary given to Sevier Bridge exclusively. And finally, when releases are not made to Piute and Section-A primary is not allocating storage flows, diversions by Piute should be handled credit exchanges in Piute Reservoir. These conditions generally occurred in June and September of 1965. Table 8 and 9 summarize the water division during these months and illustrate~~

the above noted operating criteria. It should be noted that figures for Piute Canal include canal losses as well as river losses (6%) as developed by the users. To get the release to Piute the diversions are multiplied by 1.176.

These procedures require that the storage water due Sevier Bridge be identified as first of month storage in Piute, storage released, storage taken over Vermillion Dam from accretion below Piute Reservoir, and additional storage made because of by-passed primary flows. The daily computations should be summarized in the monthly reports as follows:

Storage due Sevier Bridge June 1, 1965		2,475 acre-feet
Water over Vermillion Dam		
Storage released from Piute Res.	at Piute Res. 67	<u>79 acre-feet</u>
Storage taken below Piute res.	2,025	
Zone A primary over Vermillion Dam	<u>867</u>	Remaining in Piute Res. 2,396 acre-feet
	2,959 acre-feet	
New Storage made in upper zone	6,333	
Taken below Piute Res.	<u>2,025</u>	
	4,308 acre-feet	<u>4,308 acre-feet</u>
New Storage due Sevier Bridge July 1, 1965		6,704 acre-feet

Table 8. Allocation of flows among storage and primary rights in Section A,  
June 1965.

Date	at Willow			Releases To Piute Canal <sup>1/</sup>	Releases To Vermil- lion Dam	Net Releases Vermillion Dam	Storage Make Zone A	Storage over Vermillion	Primary over Vermillion
	Piute Reservoir Releases	Flows over Vermillion Dam	Creek Weir Piute Canal						
1	42	39	32	38	4	3	0	0	36
2	109	25	34	40	25	21	4	4	0
3	118	14	38	45	0	0	56	14	
4	148	4	46	54			55	4	
5	160	2	38	45			79	2	
6	190	25	49	58			123	25	
7	233	64	63	74			166	64	
8	203	79	59	70			231	79	
9	146	53	59	70			241	53	
10	115	3	54	64			209	3	
11	118	0	51	60			211	0	
12	134	4	62	73			176	4	
13	57	28	29	34			171	28	
14	39 <sup>1/</sup>	112	18	21			250	112	
15	9 <sup>1/</sup>	127	12	0			295	127	
16	7	109	14	0			264	109	
17	6	77	10	0			206	77	
18	6	32	11	0			107	32	
19	5	10	11	0	0	0	40	10	0
20	16	20	13	15	1	1	0	0	19
21	26	52	20	24	2	2	0	0	50
22	27	73	20	24	3	3	0	0	70
23	27	98	24	27	0	0	41	41	57
24	34	79	33	34	0	0	96	79	0
25	46	84	44	46	0	0	102	84	0
26	47	93	36	42	5	4	42	42	47
27	11	85	32	11	0	0	28	28	57
28	8	47	23	0	0	0	0	0	47
29	7	30	20	0	0	0	0	0	30
30	7	24	18	0	0	0	0	0	24
31									
Total		1492			40	34	3193	1021	437
Acre-feet		2959			79	67	6333	2025	867

<sup>1/</sup> reservoir leakage is usually about 5 cfs.

**Table 9.** Division of flows in Section between storage and primary interests,  
September 1965.

Date	Piute Reservoir Releases	Flows Vermillion Dam	at Willow cr Weir Piute Canal	Releases To Piute Canal	Releases to Vermil- lion Dam	Net Releases Vermillion Dam	Storage make Zone A	Storage over Vermillion	Primary over Vermillion
1	470	2			2	2	0	0	
2	455	3			4	3			
3	445	21			25	21			
4	422	18			21	18			
5	411	27			32	27			
6	397	53			62	53			
7	383	65			76	65			
8	379	55			65	55			
9	383	66			78	66			
10	379	64			75	64			
11	368	66			78	66			
12	356	73			86	73			
13	349	77			91	77			
14	356	63			74	63			
15	371	50			59	50			
16	379	47			55	47			
17	342	55			65	55			
18	270	79			93	79			
19	237	74			87	74			
20	198	88	21	25	104	88			0
21	116	97	10	12	104	88			9
22	71	62	5	6	64	55			7
23	68	38	5	6	45	38			0
24	59	43	5	6	51	43			0
25	23	63	5	6	17	14			49
26	33	58	5	6	27	23			35
27	31	37	10	12	19	16			21
28	16	33	12	14	2	2			31
29	7	34	5	6	0	0			34
30	53	32	5	6	38	32	0	0	0
31									
Total		1543			1600	1357			186
Acre-feet		3061			3174	2692			369

Below Vermillion Dam. River losses below Vermillion Dam were detailed in part 2 in this series. Because these losses are fairly straight forward, they will not be present here again.

#### SUMMARY

Water management problems in the Sevier River Basin are complicated by the generally short water supply and the rather unique provisions for its administration. The Cox Decree which defines most of the Sevier River water rights has been criticized at times for its complexity and ambiguity. We can sympathize with such comments, but also point out that its precepts have resulted in higher water use efficiency than any other major river system.

The most important features of the Cox Decree are: (1) a division of primary and storage rights so far as physical water being divided but an integration so far as using reservoir capacity to regulate river flows; and (2) proration among classes of water in each segment of the water right structures. These features distribute shortages along the entire river system, thereby, forcing irrigation of the most profitable land as the highest priority for the water.

This final report in a three part series, describes the rights and operation of the major storage facilities. Utilizing all three, a reader has a very practical (and operationally

based) description of the Cox Decree. Hopefully, these reports will better inform water users as well as the varied governmental interests as to the allocation of limited water resources in the Sevier River Basin.

The appendix details the 1967 year's operation as well as selected examples of monthly reports to the users.

A P P E N D I X

DETAILED ILLUSTRATION OF CALCULATION  
PROCEDURES FOR 1967

Division of flows in Section A between storage and primary interest,  
April 1967.

Date	Piute Reservoir Releases	Flows over Vermillion Dam	at Willow Creek Weir Piute Canal	Releases to Piute Canal	Releases to Vermil- lion Dam	Net Releases Vermil- lion Dam	Storage make Zone A	Storage over Vermillion	Primary over Vermillion
1	107	98							
2	103	92			107	91	0	0	7
3	103	89			103	88			4
4	107	80			103	88			1
5	103	78			94	80			
6	100	76			92	78			
7	103	73			89	76			
8	96	79			86	73			
9	89	73			93	79			
10	86	68			86	73			
					80	68			
11	82	67							
12	82	69			79	67			
13	89	71			81	69			
14	86	56			84	71			
15	103	57			66	56			
16	111	67			67	57			
17	111	66			79	67			
18	111	57			78	66			
19	111	60			67	57			
20	118	69			71	60			
					81	69			
21	118	80							
22	137	77			94	80			
23	167	69			91	77			
24	237	74			81	69			
25	240	76			87	74			
26	240	66			89	76			
27	272	51			78	66			
28	282	53			60	51			
29	278	53			62	53			
30	275	50			62	53			
31					59	50			
Total		2094			2449	2082			12
Acre-feet		4153			4858	4130			24



Division of flows in Section between storage and primary interest,  
May 1967.

Date	Piute Reservoir Releases	Flows over Vermillion Dam	at Willow Creek Weir Piute Canal	Releases to Piute Canal	Releases to Vermil- lion Dam	Net Releases Vermil- lion Dam	Storage make Zone A	Storage over Vermillion	Primary over Vermillion
1	262	56							
2	256	69			66	56			
3	252	62			81	69			0
4	249	56			73	62			
5	249	47			66	56			
6	246	41			55	47			
7	246	29			48	41			
8	256	29			34	29			
9	337	29			34	29			
10	418	29			34	29			
11	418	32			34	29			
12	422	28			38	32			
13	490	38			33	28			
14	456	31			45	38			
15	456	46			36	31			
16	452	59			54	46			
17	445	52			69	59			
18	437	23			61	52			
19	437	38			27	23			
20	437	47			45	38			
21	412	79	84	99	55	47			
22	320	79	78	92	93	79			
23	302	102	81	95	93	79			
24	265	94	93	109	120	102			
25	243	118	82	96	5	4	90	90	
26	168	153	65	76	12	10	108	108	
27	140	150	41	48	0	0	238	153	
28	140	145	40	47	0	0	281	150	
29	144	159	30	35	0	0	236	145	
30	140	106	35	41	0	0	252	159	
31	120	111	31	36	0	0	207	106	
Total		2137			0	0	196	111	
Acre-feet		4239			1311	1115	1608	1022	0
					2600	2212	3189	2027	0

Division of flows in Section A between storage and primary interest,  
June 1967.

Date	Piute Reservoir Releases	Flows over Vermillion Dam	at Willow Creek Weir Piute Canal	Releases to Piute Canal	Releases to Vermil- lion Dam	Net Releases Vermil- lion Dam	Storage make Zone A	Storage over Vermillion	Primary over Vermillion
1	52	57	20	24	0	0	138	57	0
2	59	41	20	24	0	0	43	41	0
3	54	42	27	32	22	19	0	0	23
4	57	43	27	32	25	21	0	0	22
5	82	47	39	46	18	15	32	32	0
6	92	62	45	53	0	0	96	62	0
7	156	82	55	65	0	0	117	82	0
8	146	37	71	83	0	0	113	37	0
9	149	17	76	89	0	0	81	17	0
10	137	17	76	89	0	0	80	17	0
11	130	17	75	88	0	0	86	17	0
12	133	28	75	88	0	0	69	28	0
13	130	43	83	98	15	13	30	30	0
14	103	65	79	93	8	7	58	58	0
15	64	65	59	69	0	0	86	65	0
16	2	61	25	29	0	0	64	61	0
17	43	71	14	16	27	23	35	35	13
18	86	100	14	16	70	60	9	9	31
19	86	138	0	0	71	60	78	78	0
20	82	157	0	0	76	65	92	92	0
21	75	167	0	0	53	45	122	122	0
22	82	164	0	0	71	60	104	104	0
23	74	188	0	0	74	63	82	82	43
24	3	193	0	0	0	0	157	157	36
25	2	152	0	0	0	0	118	118	34
26	2	117	7	8	0	0	68	68	49
27	2	89	14	16	0	0	44	44	45
28	2	42	26	31	0	0	6	6	36
29	53	29	30	35	18	15	0	0	14
30	126	18	43	51	21	18	0	0	0
31									
Total		2349			569	484	2008	1519	346
Acre-feet		4659			1129	960	3976	3013	686

Division of flows in Section ) between storage and primary interest,  
September 1967.

September 1967.									
Date	Piute Reservoir Releases	Flows over Vermillion Dam	at Willow Creek Weir Piute Canal	Releases to Piute Canal	Releases to Vermil- lion Dam	Net Releases Vermil- lion Dam	Storage make Zone A	Storage over Vermillion	Primary over Vermillion
1	349	19							
2	317	15				19			
3	296	15				15			
4	268	21				15			
5	256	11				21			
6	246	28				11			
7	223	33				28			
8	209	38				33			
9	165	54				38			
10	126	15				54			
11	82	12				15			
12	100	0				12			
13	100	16				0			
14	96	13				16			
15	100	3				13			
16	86	1				3			
17	79	8				1			
18	103	11				8			
19	107	17				11			
20	122	14				17			
21	107	11		33		14			
22	107	20		29		11			
23	149	130		18		20			
24	108	234		21	0		0		
25	57	158		0	0		487	130	
26	8	125		0	0		468	234	
27	4	76		0	0		609	158	
28	9	47		0	0		237	125	
29	22	33		15	0		75	75	1
30	48	24		26	0		21	21	26
31				25		20	0		33
Total		1044							4
Acre-feet		2384				395	1897	743	64
						783	3763	1474	127

SUMMARY OF STORAGE DIVISION IN ACRE-FEET FOR 1967.

	Vermil- lion Dam Flows	Storage Sevier Bridge	Storage Piute Res.
APRIL			
Due Sevier Bridge April 1		66478	19158
Water over Vermillion	4153	<u>3663</u>	
Zone A Primary over Vermillion	<u>24</u>	70141	
Released at Piute Reservoir	4129		<u>4858</u>
Storage due Sevier Bridge May 1			14300
MAY			
Water over Vermillion	4239	<u>3739</u>	
Storage taken below Piute	<u>2027</u>	73880	
Released at Piute Reservoir	2212		<u>2602</u>
Due Sevier Bridge June 1			12698
JUNE			
Water over Vermillion	4659	<u>4109</u>	
Storage taken below Piute	3013	77989	
Zone A Primary over Vermillion	<u>686</u>		
	960		-1129
New Storage captured in Piute			<u>+ 963</u>
Due Sevier Bridge July 1			13694
JULY			
Water over Vermillion	2592	<u>2235</u>	3049
		80224	
Due Sevier Bridge August 1			<u>10645</u>

continued page 49

Vermil- lion Dam Flows	Storage Sevier Bridge	Storage Piute Res.
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AUGUST 1/

Water over Vermillion	3210	<u>2769</u>	3776
Due Sevier Bridge September 1		82993	<u>6869</u>

SEPTEMBER

Water over Vermillion	2384	<u>2056</u>	
Storage taken below Piute	1474	85049	
Zone A Primary over Vermillion	<u>127</u>		<u>921</u>
Released at Piute	783		5948
Due Sevier Bridge		89280	<u>5641</u>
2nd Priority for Piute Reservoir			307

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1/ Daily computations not necessary.

SEVIER VALLEY CANAL 1/

May 1, 1976		in acre-feet
Credits May 1, 1976		4520
Primary 74.9%		236
2nd Class		1150
Otter Creek new storage		430
Three Creeks		800
Taylor Fish Ponds		246
Mitchel's Slough		461
Transfers from Piute		<u>1412</u>
		9255 acre-feet
Use in Canal	3640	
Otter Creek Reservoir loss	192	
Water over Vermillion Dam	<u>21</u>	
	3853	<u>-3853</u>
Balance End of Month		5402 acre-feet

RICHFIELD CANAL

July 1976		in acre-feet
Balance beginning of month		4812
Primary 26.3%		365
Transfers from Piute		<u>573</u>
		5740
Use in Canal	3013	
Otter Creek Reservoir loss	185	
River loss	142	
Water over Vermillion Dam	<u>150</u>	
	3490	<u>-3490</u>
Balance End of Month		2260 acre-feet

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1/ Examples are computed from corrected record.

CENTRAL UTAH WATER COMPANY

- May 1974 -

Credits May 1, 1974		80309 acre-feet
Primary 100% 18.7 cfs		1147
AA Water 3.3 cfs		203
C Water		757
E Water		157
F Water		88
New Storage in lower zone 35.4% of 900 af		319
Fool Creek		<u>2541</u>
		85521 acre-feet
In Canal	10020	
River Loss	500	
Reservoir Loss	<u>2068</u>	
	12588	<u>-12588</u>

Credits June 1, 1974	72933 acre-feet
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DESERET IRRIGATION COMPANY

- May 1974 -

Credits May 1, 1974		46758 acre-feet
Primary 100% 74 cfs		4542
B Water		658
D Water		5714
Storage made in lower zone 20.55% of 900 af		185
Wells		133
Lincoln Cropper		442
Transfers		<u>1405</u>
		59837 acre-feet
In Canal	11749	
Gunnison Bend loss	229	
DMAD loss	245	
River loss	940	
Sevier Bridge loss	1258	
Piute stock	<u>416</u>	
	14837	<u>-14837</u>

Credits June 1, 1974	45000 acre-feet
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MELVILLE IRRIGATION COMPANY

- May 1974 -

Credits May 1, 1974		28363 acre-feet
Wells - local		133
		<hr/>
		28496
In Canal	5934	
Canal A loss	121	
DMAD loss	221	
River loss	475	
Sevier Bridge loss	689	
Transfers	439	
	<hr/>	
	7879	
		<hr/>
		-7879
Credits June 1, 1974		20617 acre-feet

WEST VIEW IRRIGATION COMPANY

- May 1974 -

Credits May 1, 1974			702 acre-feet
Primary 100%	23.7 cfs	1455 - 146	1309
AA Water	1.5	92 - 9	83
Well Water	1.0	61 - 6	55
F Water		583 - 58	525
			<hr/>
			2674 acre-feet
			<hr/>
			- 1716
			<hr/>
			958 acre-feet
Credits June 1, 1974			

GUNNISON FAYETTE CANAL COMPANY

- May 1974 -

Credits May 1, 1974			826 acre-feet
Primary 100%	16.5 cfs	1024 - 31	993
Dyrenge	6.0	369 - 37	332
Fritch loan	3.2	196 - 20	176
Nielson	1.0	61 - 6	55
Bown	2/3	41 - 4	37
Roberts	1/3	20 - 2	18
AA Water Canal	1.4	86 - 3	83
AA Mellor	.7	43 - 4	39
F Water Canal		292 - 9	283
F Water Dyrenge		13 - 1	12
			<hr/>
			2854 acre-feet
			<hr/>
			-1281
			<hr/>
			1573 acre-feet
Credits June 1, 1974			